

IN THE CLAIMS:

1 1. (Currently ~~Amended~~) A computer network having improved reliability in data trans-
2 missions, comprising:

3 an interpreter in a switch for interpreting a special multicast address in a packet
4 received by said switch, said switch in response to receipt of a packet having said special
5 multicast address, replicating said packet by transmitting identical copies of said packet
6 on a plurality of ports of said switch;

7 a first router for receiving a first copy of said packet having said special multicast
8 address transmitted from a first port of said plurality of ports of said switch, and a second
9 router for receiving a second copy of said packet having said special multicast address,
10 said second packet transmitted by a second port of said plurality of ports of said switch;

11 a first plurality of subsequent routers connected to said first router along an in-
12 tended path for said first copy of said packet, said intended path having a plurality of
13 links, and said links assigned a low cost in a Link State Packet Routing sense; and

14 a second plurality of routers connected to said second router along an intended
15 path for said second copy of said packet, said intended path having a plurality of links,
16 and said links assigned a low cost in a Link State Packet Routing sense, said first plural-
17 ity of routers connected to said second plurality of routers by links having assigned high
18 costs in a Link State Packet Routing sense.

1 2. (Currently ~~Amended~~) A network device for forwarding voice packets on a computer
2 network, comprising:

3 an input port for receiving said voice packet;

4 a plurality of output ports assigned for transmitting said voice packet out of said
5 network device in the event that a received packet carries a special multicast address in a
6 layer 2 destination address field of said received packet; and

7 a circuit to read said layer 2 destination address field of said received packet, and
8 in the event that said special multicast address is found in said layer 2 destination address
9 field of said received packet, to interpret said special multicast address as indicating that
10 said received packet is said voice packet, and to transfer said voice packet to said plural-
11 ity of output ports for transmission of replica packets of said voice packets through dif-
12 ferent paths in said computer network, said paths having a low cost, in a Link State Pro-
13 TOCOL (LSP) sense, said paths also having a high cost to links that would connect each of
14 said different paths to each other, said high cost effectively maintaining a non-converging
15 separateness between said different paths.

1 3. (Original) The apparatus of claim 2, further comprising: said network device is a
2 layer 2 switch.

1 4. (Original) The apparatus of claim 2, further comprising: said network device is a
2 router.

1 5. (Currently ~~Amended~~) A method of improving reliability in data communications over
2 a computer network, comprising:

3 receiving a voice data packet by a network device, replicating said voice data
4 packet, and transmitting replica packets onto a first link and a second link;

5 assigning low cost to links, including said first link, in a first desired path through
6 said computer network, said cost used by Link State Packet Routing protocol (LSP pro-
7 tocol) to select a route through said network;

8 assigning low cost to links, including said second link, in a second desired path
9 through said computer network; and,

10 assigning high costs to links between said first desired path and said second de-
11 sired path, so that in response to assigning low costs to links in said first desired path and
12 assigning low cost to said and second desired pathpaths, LSP protocol selects said first
13 desired path and said second desired pathpaths for transmitting said replica packets
14 through said network, respectively, and in response to high costs assigned to said links
15 between said first and said second desired paths, LSP does not select links that would
16 create a convergence of said first and said second desired paths when said first and said
17 second desired paths are operative, and LSP routing selects convergence of said first and
18 said second desired path upon failure of a link in either said first and said second desired
19 path.

1 6. (Currently Amended) A method of improving reliability in data communications over
2 a computer network, comprising:

3 receiving a voice data packet by a network device, replicating said voice data
4 packet, and transmitting replica packets onto a first link and a second link;

5 assigning low cost to links, including said first link, in a first desired path through
6 said computer network, said cost used by Link State Packet Routing protocol (LSP pro-
7 tolcol) to select a route through said network;

8 assigning low cost to links, including said second link, in a second desired path
9 through said computer network;

10 assigning high costs to links between said first desired path and said second de-
11 sired path, so that in response to assigning low costs to links in said first and second de-
12 sired paths, LSP protocol selects said first and second desired paths for transmitting said
13 replica packets through said network, respectively, and in response to high costs assigned
14 to said links between said first and second desired paths, LSP does not select links that
15 would create a convergence of said first and second desired paths; The method of claim
16 5 further comprising:

17 transmitting a voice data packet by a first digital telephone to a first network de-
18 vice;

19 transmitting, by said first network device, a replica packet of said voice data
20 packet onto said first link for transmission through said first desired path through said
21 computer network to a second network device;

22 transmitting, by said first network device, a replica packet of said voice data
23 packet onto said second link for transmission through said second desired path through
24 said computer network to said second network device; and

25 converting by a second digital telephone a first replica packet of said voice data
26 packet received by said second network device into audible sound, and discarding any
27 subsequently received replica packets of said voice data packet.

1 7. (Original) The method of claim 6 further comprising: selecting said first replica
2 packet of said voice data packet by said second network device.

1 8. (Original) The method of claim 6 further comprising: selecting said first replica
2 packet of said voice data packet by said second digital telephone.

1 9. (Original) The method of claim 6 further comprising: selecting said first network de-
2 vice to be a layer 2 switch.

1 10. (Original) The method of claim 6 further comprising: selecting said first network
2 device to be a router.

1 11. (~~Currently~~ Amended) The method of claim 6 further comprising:

2 writing a sequence number into said voice data packet by said first digital tele-
3 phone;

4 writing said sequence number into each said replica packet; and

5 using said sequence number to determine the first received replica of said voice
6 data packet by said second network device.

1 12. (Original) A computer readable device having instructions written thereon for prac-
2 ticing the method of claim 5.

1 13. (Original) Electromagnetic signals travelling on a computer network, said electro-
2 magnetic signals carrying instructions for practice of the method of claim 5.

1 14. ~~(New)~~ The method of claim 5 wherein LSP routing selects links that would create a
2 convergence of said first and second desired paths upon failure of a link in either said
3 first and second desired paths.

1 15. (New) A method for use with transmitting a packet from a source to a destination,
2 said method comprising the steps of:

3 assigning a low cost, in a Link State Packet (LSP) routing sense, to links on two
4 or more packet paths from said source to said destination; and

5 assigning a high cost, in an LSP routing sense, to links that would connect each of
6 said two or more packet paths to each other, said high cost effectively maintaining a non-
7 converging separateness between said two or more packet paths.

1 16. (New) The method as in claim 15, further comprising the steps of:

2 assigning a unique sequence number to said packet;
3 replicating said packet into two or more packets, each of said two or more packets
4 carrying the same unique sequence number;
5 transmitting said two or more packets over said low cost two or more packet
6 paths, respectively;
7 accepting, at said destination, a first of said two or more packets to arrive at said
8 destination; and
9 discarding, at said destination, any of said two or more packets to arrive at said
10 destination after said first packet.

1 17. (New) The method as in claim 16, wherein said steps of replicating and transmitting
2 are performed on a network device.

1 18. (New) The method as in claim 17, wherein said step of transmitting is performed
2 over two or more ports of said network device.

1 19. (New) The method as in claim 17, wherein said network device is a switch.

1 20. (New) The method as in claim 17, wherein said network device is a router.

1 21. (New) The method as in claim 15, wherein said packet originates from a digital tele-
2 phone.

1 22. (New) The method as in claim 15, wherein said packet terminates at a digital tele-
2 phone.

1 23. (New) The method as in claim 15, wherein said packet is a voice packet.

1 24. (New) A system for use with transmitting a packet from a source to a destination,
2 said system comprising:

3 a source network device having circuitry for:

- 4 (i) assigning a unique sequence number to said packet,
- 5 (ii) replicating said packet into two or more packets, each of said two
6 or more packets carrying the same unique sequence number,
- 7 (iii) assigning a low cost, in a Link State Packet (LSP) routing sense, to
8 links on two or more packet paths from said source to said destina-
9 tion,
- 10 (iv) assigning a high cost, in an LSP routing sense, to links that would
11 connect each of said two or more packet paths to each other, said
12 high cost effectively maintaining a non-converging separateness
13 between said two or more packet paths, and
- 14 (v) transmitting said two or more packets over said low cost two or
15 more packet paths, respectively;

16 at least one subsequent network device on each of said two or more packet paths
17 having circuitry for forwarding said packet along said respective packet path according to
18 said low cost link arrangement in an LSP routing sense; and

19 a destination network device having circuitry for:

- 20 (i) accepting a first of said two or more packets to arrive at said desti-
21 nation network device, and
22 (ii) discarding any of said two or more packets to arrive at said desti-
23 nation network device after said first packet.

1 25. (New) The system as in claim 24, wherein said initiating network device is a switch.

1 26. (New) The system as in claim 24, wherein said initiating network device is a router.

1 27. (New) The system as in claim 24, wherein said packet originates from a digital tele-
2 phone.

1 28. (New) The system as in claim 24, wherein said packet terminates at a digital tele-
2 phone.

1 29. (New) The system as in claim 24, wherein said packet is a voice packet.

1 30. (New) A network device for use in sending packets from a source to a destination,
2 comprising:

3 an input port for receiving packets from a source;

4 a processor for assigning a low cost, in a Link State Packet (LSP) routing sense,
5 to links on two or more packet paths from said source to said destination, and assigning a
6 high cost, in an LSP routing sense, to links that would connect each of said two or more
7 packet paths to each other, said high cost effectively maintaining a non-converging sepa-
8 rateness between said two or more packet paths; and

9 two or more output ports for transmitting said packets to a destination over said
10 two or more packet paths.

1 31. (New) An initiating network device, comprising:

2 an input port for receiving a packet; and

3 a plurality of output ports for transmitting said packet over a plurality of packet
4 paths to a single destination, each of said plurality of packet paths having a low cost in a
5 Link State Packet (LSP) routing sense, each of said plurality of packet paths also main-
6 taining a non-converging separateness between each other of said plurality of packet
7 paths by having a high cost, in an LSP routing sense, assigned to links that would connect
8 each of said plurality of packet paths to each other.

1 32. (New) A destination network device, comprising:

2 a plurality of input ports for receiving a plurality of packets over a plurality of
3 packet paths to a single destination, each of said plurality of packet paths having a low
4 cost in a Link State Packet (LSP) routing sense, each of said plurality of packet paths also
5 maintaining a non-converging separateness between each other of said plurality of packet
6 paths by having a high cost, in an LSP routing sense, assigned to links that would connect
7 each of said plurality of packet paths to each other;

8 circuitry for reading a unique sequence number on said packet, said circuitry ac-
9 cepting a first of said plurality of packets received with a unique sequence number and
10 discarding any other of said plurality of packets received with the same unique sequence
11 number after said first packet has been received; and

12 an output port for transmitting said packet to a terminating destination.

1 33. (New) A system for use with transmitting a packet from a source to a destination,
2 said system comprising:

3 means for assigning a low cost, in a Link State Packet (LSP) routing sense, to
4 links on two or more packet paths from said source to said destination; and

5 means for assigning a high cost, in an LSP routing sense, to links that would con-
6 nect each of said two or more packet paths to each other, said high cost effectively main-
7 taining a non-converging separateness between said two or more packet paths.

1 34. (New) The system as in claim 33, further comprising:

2 means for assigning a unique sequence number to said packet;

3 means for replicating said packet into two or more packets, each of said two or
4 more packets carrying the same unique sequence number;

5 means for transmitting said two or more packets over said low cost two or more
6 packet paths, respectively;

7 means for accepting, at said destination, a first of said two or more packets to ar-
8 rive at said destination; and

9 means for discarding, at said destination, any of said two or more packets to arrive
10 at said destination after said first packet.

1 35. (New) A computer readable device having instructions written thereon for practicing
2 the method of claim 15.

1 36. (New) Electromagnetic signals travelling on a computer network, said electromag-
2 netic signals carrying instructions for practice of the method of claim 15.